

REMARKS

Claims 1-11 are pending in the application. Claims 1-4 and 6-11 were rejected as anticipated by Zhang, et al. Claim 5 was rejected as obvious in view of Zhang, et al. and Inou.

5 Applicants have amended claim 1 to include the limitations of claim 2, and have discussed how the present application is distinguished over the art cited against it.

35 U.S.C. §102(e) Anticipation by Zhang et al. of Claims 1-4 and 6-11

10 *1. Zhang does not disclose hydrogen diffusion by irradiation with an energy beam, but rather teaches hydrogen diffusion conducted by heat treatment; Zhang uses the irradiating pulse energy beam to crystallize an amorphous silicon film, not for hydrogen diffusion.*

15 Applicants note that the hydrogen diffusion of Zhang occurs in a heat treatment/thermal processing step. "...act as a hydrogen ion source in a later hydrogenation step that is a *thermal processing step for thermally diffusing hydrogen ions*. 5/53-55, emphasis added. See also 7/4-10 discussing the thermal treatment inside of the processing chamber. Applicants observe that this thermal processing step occurs subsequently to the use of the laser irradiation. See 6/58-64 describing the use of the laser and thermal annealing-- then 6/65 discusses the *subsequent* process steps of forming the silicon film 114, and then after
20 that, of diffusing the hydrogen.

The light irradiation of Zhang does not diffuse the hydrogen, but rather serves to crystallize the amorphous silicon film. "Thereafter, an amorphous silicon film is crystallized by... UV laser irradiation..." 4/33-40. "...a KrF excimer laser light irradiation and thermal

annealing are carried out.... This processing step can improve the crystallinity of the active layer 103 damaged by the ion doping step.” 6/58-64. It is clear from these passages that the laser irradiation is not a hydrogen-diffusing irradiation, but rather is a crystal forming/improving irradiation.

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2. Zhang simply teaches a thermal processing of a glass substrate at an early step in the processing to suppress shrinkage of the glass substrate during later heating steps, which does not preclude the possibility that the pulse energy beam could melt the semiconductor film.

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Applicants have amended claim 1 to include the limitations of claim 2 claiming the step of determining parameters of the pulse energy beam such that the beam does not melt the semiconductor film.

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The Examiner refers to 4/15-20 of Zhang as teaching a non-melting of the semiconductor film by the pulse energy beam, but applicants respectfully contend that this passage deals solely with the glass substrate and not with the semiconductor film. Applicants note that the language used in this passage relating to the prevention of shrinkage of the glass substrate does not preclude the possibility of later melting of the semiconductor with a pulse energy beam.

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3. Zhang does not teach using the energy beam at a lower energy density while heating the hydrogen layer than when crystallizing, but rather simply discloses using a laser for a crystallizing step and a re-crystallizing step (the latter being the only use teaching a particular power setting).

Applicants only note two uses of a laser in Zhang: 1) the initial crystallization of the amorphous silicon film (4/33-39, 8/61-63); and 2) the re-crystallization of the active layer (6/58-64, 10/15-22). In only the latter use are particular power levels taught, so there can be no teaching of a “lower” energy density when only a single energy density is taught.

5 Furthermore, the disclosure relating to a crystallization and re-crystallization step in Zhang does not read on power comparisons relating a crystallization and a hydrogen layer heating step. Therefore, Zhang cannot be said to anticipate this particular limitation of the invention.

For the above reasons, applicants contend that Zhang does not anticipate the present invention and respectfully request that the Examiner withdraw the 35 U.S.C. §102(e) rejection
10 in the present application.

35 U.S.C. §103(a) Obviousness in View of Zhang et al. and Inou of Claim 5

4. *The distinctions noted in the previous paragraphs pertaining to Zhang render claim 5 of the present invention non-obvious in view of Zhang and Inou--Zhang and Inou
15 combined do not render the step of hydrogen diffusion using a laser obvious.*

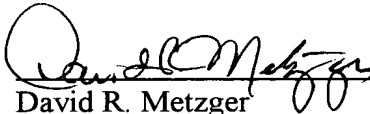
Applicants do not disagree with the examiner that the limitation pertaining to the composition of a plastic substrate is taught by Inou. In light of the arguments made above, however, neither Zhang, Inou, or the combination of Zhang and Inou teach the basic aspect of hydrogen diffusion using a laser, nor render such a step as being obvious.

20 For this reason applicants respectfully request that the Examiner withdraw the 35 U.S.C. §103(a) rejection in the present application.

Conclusion

Inasmuch as each of the rejections have been fully addressed, and all of the examiner's concerns have been satisfied, it is respectfully requested that the present application be reconsidered, the rejections be withdrawn and that this application be passed to issue. The
5 Examiner is invited to contact the attorney below should any questions remain.

Respectfully submitted,

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